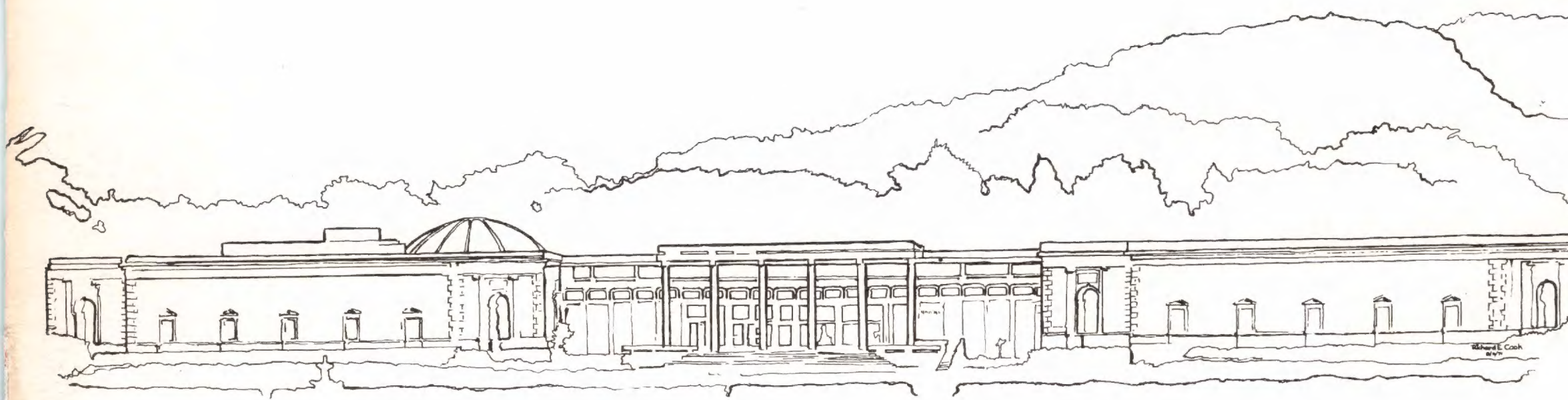




CALIFORNIA ACADEMY OF SCIENCES

ANNUAL REPORT

1970-71



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A MESSAGE FROM THE CHAIRMAN

THIS year's report looks back over the past decade and summarizes pertinent facts in the affairs of the Academy. An assessment of its past activities is valuable for an institution in planning for its future. The facts and figures are impressive.

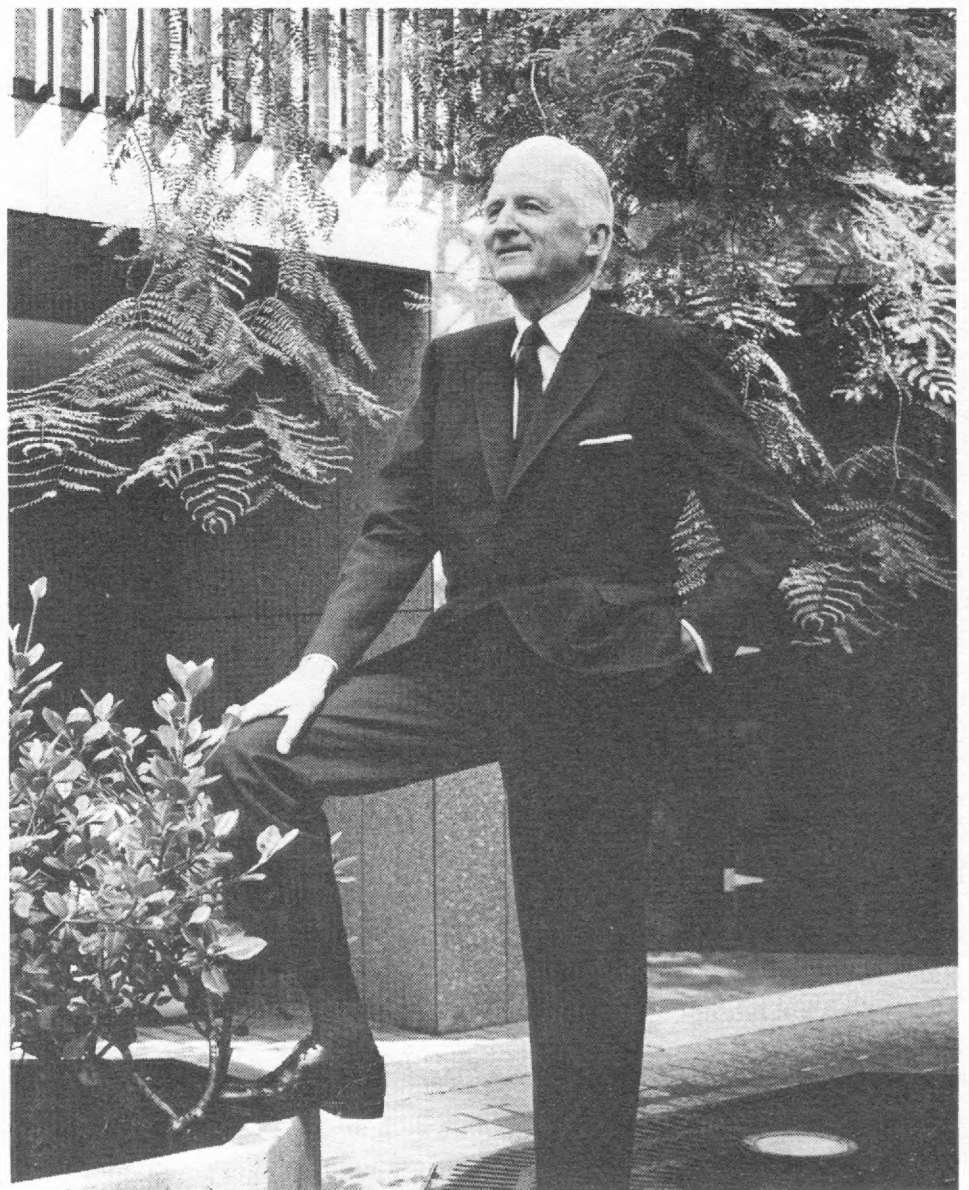
The growing role of the California Academy of Sciences in natural science research during this period has resulted in a fifty percent increase in the research staff, and the total Academy staff has grown from 113 to 185. An outstanding example of growth is the Ichthyology Department, which in 1961 was staffed by two employees, one of them part-time, and had a collection of fishes, important but mostly local, which numbered about 35,000 "lots" of specimens, as ichthyologists measure their holdings. The decade saw the complete renovation of the department and the acquisition of the George Vanderbilt Foundation collection of Indo-Pacific fishes, then the addition of the huge Stanford University collection, with the help of grants from the National Science Foundation under the direction of Drs. Earl S. Herald and William N. Eschmeyer. In June 1971 the Ichthyology Department had a staff of seven employees and its collection of 165,000 "lots" is the second or third largest and most important in the world.

The Academy's budget has grown very substantially. Through the concerned efforts of the Trustees, income sources have kept pace with budgetary needs. Like other academic organizations, we have had to strive hard to meet the rising costs of inflation. Moreover, ten years ago the salary levels of Academy employees were lower than comparable institutions. Today our employees receive salaries which compare favorably with those of other major natural science academies and most academic institutions.

The source of funds for support of the Academy has broadened substantially. The unrestricted and restricted endowment funds invested in marketable securities which were \$400,000 in 1961 are now approaching \$3 million. Rent from the Commercial Building produces approximately one-half of the total endowment income. We now have fifty Friends of the Academy who each give at least \$1,000 annually for Academy support. Membership dues, contributions from business organizations, foundations, individuals, and trusts, including gifts to the endowment, have averaged between \$400,000 and \$500,000 in the past two years. A \$1,500,000 gift from the Cowell Foundation provided the Academy with beautiful Cowell Hall. An admission charge to public halls was initiated this past year. The proceeds from this charge combined with the City support of the Aquarium and museums have made it possible for the Academy to provide more adequate exhibits and programs for its 1,500,000 annual visitors.

Community interest in the Academy's activities has greatly broadened in this period. Morrison Auditorium, which seats 450 persons, was more than adequate for members' meetings ten years ago and now three sessions are required for each meeting. Seventy volunteer docents have completed rigorous courses of instruction and now provide free guide service for the museum's visitors.

The decade adds up to impressive accomplishments for the Academy. Because of our eminent position as one of the world's great natural science museums and with man's growing concern about conserving and protecting his environment, the Academy is certain to have increasing demands upon its resources. To take



a hard look ahead and to give guidance to the Trustees and the Academy administration, a Planning Committee with Kenneth K. Bechtel as Chairman has been appointed. This committee is studying and evaluating the course and the goals of the Academy and its probable needs for the coming decade and beyond. There is need for improved exhibits about man and his environment, improved services for the museum visitors and for continued growth of the science departments. It is essential that the endowment funds be multiplied because they are vital for the continued distinction of the Academy's natural science research and museum presentations.

This was a year of great personal sadness to the staff and Trustees. Death took Dr. Siemon W. Muller, a distinguished geologist and for many years Secretary of the Board. Trustee Edward W. Bullard, Jr., a man who gave of his energy and enthusiasm unselfishly to the Academy and who distinguished himself in other community services, died on June 29, 1971. Dr. G Dallas Hanna, dean of Academy scientists and on the staff fifty-one years, died on November 20, 1970.

We welcomed to the Board of Trustees Paul L. Davies, Jr. and Merritt K. Ruddock. Mr. Davies, an attorney, is a Regent of the University of the Pacific and a member of the Board of Overseers of the Hoover Institution at Stanford University. Mr. Ruddock is a Trustee of Occidental College and served for many years as Director of the World Affairs Council of Northern California.

We are grateful to our friends in the City and County of San Francisco, and to the individuals, corporations and foundations who have provided their generous financial help during this past year. The Director's report which follows reviews the accomplishments which their support made possible.

E. Morris Cox

E. MORRIS COX
Chairman, Board of Trustees



REPORT OF THE DIRECTOR

ON this, the first year a charge has been made to enter the Academy, 816,744 persons paid admission: 662,312 adults paid fifty cents and twenty-five cents was charged 154,432 children between 12 and 18 years of age. At the same time free admission was given to 260,467 children under twelve; 25,916 persons over 65; 14,363 persons who showed Academy membership cards; 11,542 guests of members; 62,007 on free days (the first day of each month) and 234,927 who came in organized groups. Thus there were 816,774 paid admissions and 609,222 free admissions.

Gross income from admissions was \$370,049, and it made possible a balanced operating budget for the first time in four years. During that time the dollar support allocated to the Academy by the City and County of San Francisco remained about the same, while cost-of-living increases in City-provided salaries resulted in an actual decrease in the level of City support. Admission charges have made up the difference between previously available income and the expenditures necessary for efficient operation.

The idea of a free museum is attractive, but no mu-

seum is actually free. If admission is not charged the visitor is being subsidized by someone else. With charges, those who use the institution help with its support.

HIGHLIGHTS

The California Academy of Sciences was among the first of the sixteen museums in the United States to be granted the distinction of accreditation by the American Association of Museums.

The annual meeting, held October 7, 1970, was attended by 1,300 members and guests. On November 7 the Fellows of the California Academy of Sciences awarded President A. Starker Leopold the Fellows' Medal, the highest honor the Academy can bestow for scientific achievement, in recognition of his enormous contributions in teaching, conservation, and wildlife management. Secretary of the Smithsonian Institution S. Dillon Ripley addressed the Fellows on that occasion.

A major permanent exhibit about the Academy, donated by friends and relatives of the late Barrett G. Hindes, was opened in Cowell Hall in January.

Mr. Paul L. Davies, Jr., was elected to the Board of Trustees on January 6, 1971.

A mounted polar bear of record size was presented to the Academy by Mr. David D. Bohannon, who shot the animal on the ice pack off Kotzebue. Mrs. Jean McCaughey gave a "blue" or "glacier bear" which she killed in Alaska and had prepared for museum exhibition. These specimens were installed in a new bear exhibit in North American Hall.

The outstanding special event of the year was *African Adventure*, which attracted a thousand people to the Academy on April 29. Sponsored by the Docents and Docent Council, under the general chairmanship of Mrs. Thomas Curran, the adventure was profitable and it was fun.

The 18th Annual San Francisco Bay Area Science Fair brought hundreds of young scientists and their projects to the Academy for competition and further awards March 24 to 31.

FIELD WORK AND EXPEDITIONS

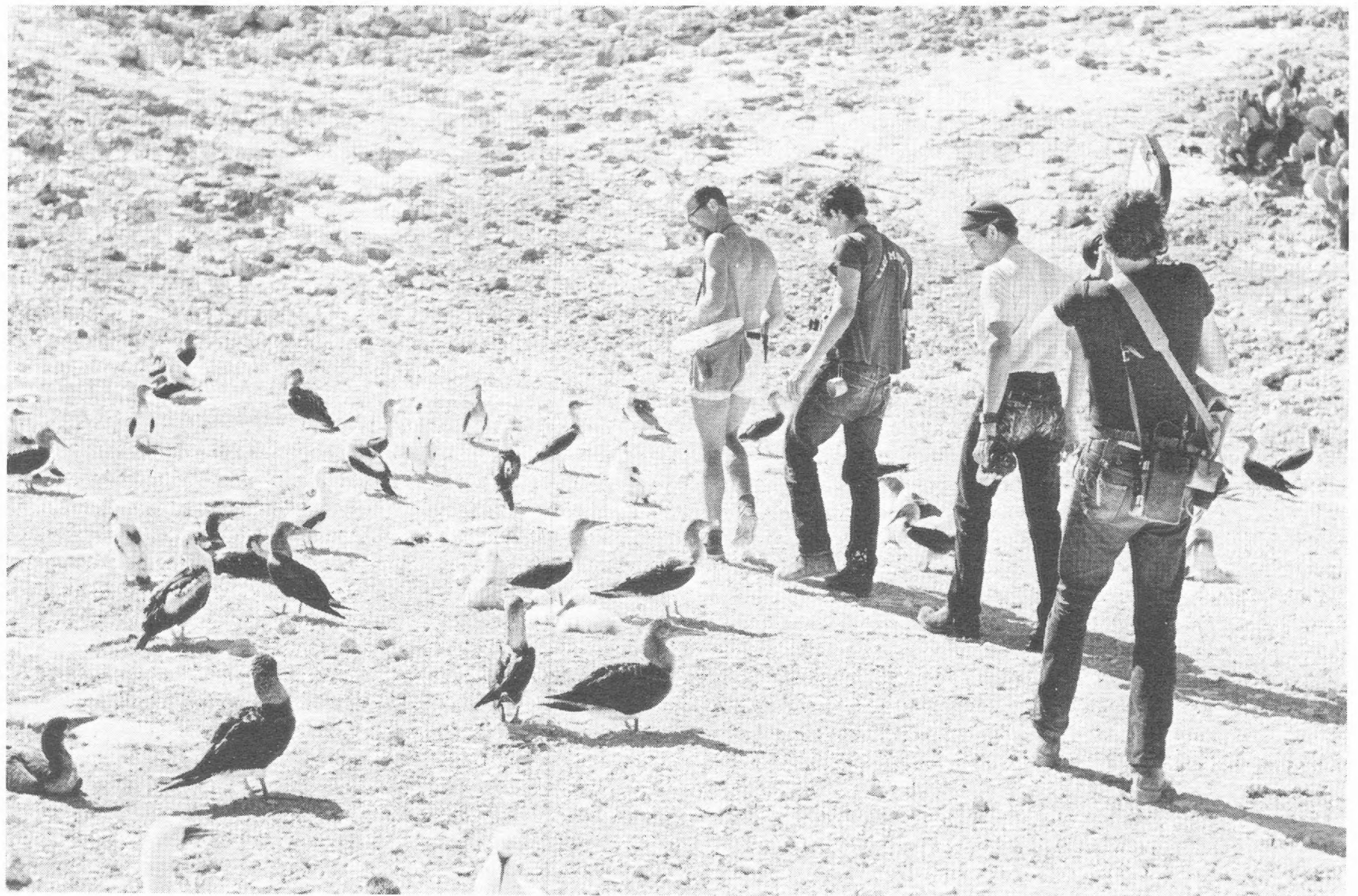
Academy scientists and their associates worked in many parts of the world. California and the southwestern United States claimed the field attention of some, and Baja California, the Gulf of California, mainland Mexico, and the Revillagigedo Islands were visited by others. A photographic and study expedition went to the Galapagos Islands and the Amazon Basin. A group of members visited Guatemala. People worked in Trinidad, Africa, Australia, the Philippine Islands, New Zealand, Indonesia, Thailand, Formosa and Japan. Thousands of specimens unrepre-



Above, Mrs. Austin Morris, Chairman of the Docent Council, and Academy Director George Lindsay at the African Adventure bazaar. Below left, members' meeting, Morrison Auditorium. Below, Academy President A. Starker Leopold was awarded the Fellows' Medal in recognition of his contribution as a scientist, teacher, and conservationist.



Right, a motion picture, "Enchanted Isles," was filmed on the Academy's Galápagos expedition of July-August, 1970, sponsored by Mr. and Mrs. Kenneth Bechtel and the Belvedere Scientific Fund. Below, an "open house" for members was a part of the annual meeting held October 7, 1970.



sented in Academy research collections, many for the first time represented in *any* collection, were accumulated. This is part of the task of inventorying the biota of our planet, and that is a prime responsibility of a natural history museum.

STEINHART AQUARIUM

Earl S. Herald, Associate Director and Chairman. A special collecting expedition to the Revillagigedo Islands aboard the research vessel *Searcher*, sponsored by Mr. Edwin Janss, Jr. of Los Angeles, netted a fine collection of

tropical fishes not before displayed at Steinhart Aquarium. The *Searcher* also worked northern California waters and San Francisco Bay for the Aquarium and the Invertebrate Zoology department, and Mr. Janss also provided his motor cruiser *Cuckoo's Nest* for Aquarium collecting in the Gulf of California.

The Steinhart Divers, a scuba group of avocational ichthyologists and aquarists, were ambitious collectors for the Aquarium display tanks. From the divers and many other sources 11,384 animals were collected, 2,141 were received as gifts, 501 through exchange, and 501 were purchased.

Aquarium herpetologist Karl Switak made a six-week trip to Indonesia, Australia and New Guinea for study and collection of reptiles and amphibians.

The Aquarium remains the most popular exhibit section of the Academy, but it serves a research function as well, and is the headquarters for several cooperative research projects. Members of the Aquarium staff also provided a course about aquatic organisms for the Junior Academy summer program.

MORRISON PLANETARIUM

Captain Robert D. Risser, U. S. N. (Ret.), Supervisor. The planetarium was closed sixteen days in November for the first major overhaul of the projector which had been in continuous operation for eighteen years. It is expected that the remarkable instrument, which was manufactured at the Academy, will continue to serve well for some years into the future.

There were 929 performances during the year, attended by 147,482 people, and 137 student shows for 40,938 persons, for a total attendance of 188,420. Four live music special events were presented in eight evening per-



formances. The student educational programs were "Moon-trip" for primary grades, "The Solar System" for intermediate groups, and "The Milky Way" which was prepared for more advanced students.

The planetarium again offered evening courses in celestial navigation and popular astronomy, and 359 registered.

INSTRUMENT SHOP

Steven B. Craig, Superintendent. The instrument shop develops and fabricates special equipment for the planetarium, and provides services to all other Academy departments. In addition, it manufactured three Foucault pendulums, one of which went to West Pakistan, and some otherwise unavailable scientific equipment.

The Academy printshop, which also services all departments, is under the jurisdiction of the instrument shop.

Above left, baby harbor seals live at Steinhart Aquarium. (Photograph by Jeff Meyer) Above, Aquarists Al Castro and Bill Rohrs and Aquatic Biologist Richard Shopen transferred the dolphins to temporary quarters to permit the renovation of their tank. (Photograph by Bruce Finson) Below, Steinhart Aquarium Associate Director Dr. Earl S. Herald examining the rare golden angelfishes captured in the Revillagigedo Islands by Janss Foundation "R. V. Searcher."





JUNIOR ACADEMY

Kenneth E. Lucas, Supervisor; Darrel McKenzie and James Carlton, Instructors. The California Junior Academy of Sciences is a place where talented youngsters, from nine to eighteen years of age, can study their natural world. There are 430 members of the Junior Academy, nearly all of whom took one or more of the twenty-one formal courses offered in the summer class schedule or on Saturdays during the school year. Fourteen student assistants helped with classes and field trips. Older students gave guest lectures in many courses, and many worked directly with younger members, teaching them new skills and techniques.

The San Francisco Foundation granted \$20,330 to the California Junior Academy of Sciences for the improvement of the classroom and office and collection areas, the purchase of a field vehicle and equipment, microscopes, books, furniture and other things which greatly facilitate its programs. This was the most important assistance ever given the Junior Academy.

DOCENT COUNCIL

Mrs. Austin Morris, Chairman and Mrs. Kathleen F. Bowman, Executive Secretary. Seventy active docents, all graduates of one or more training courses, gave their guide services to school class groups and other Academy visitors. During the year 4,755 students received this important help in interpreting North American and African Hall exhibits.

The third basic training course, of which Mrs. Roland Perkins was chairman, was completed by twenty-nine prospective docents, and twenty earlier graduates elected to take an advanced course on Simson African Hall, Mineral Hall and Fossil Hall under the direction of Mrs. George Osborne. Dr. Robert T. Orr and other Academy staff members assisted with these programs.

A monthly newsletter, *TOURisms*, was edited by Mrs. Rex Butler and assisted communication between the twelve Administrative Committee members and the seventy docents.

A special benefit event, *African Adventure*, was given by the docents under the chairmanship of Mrs. Thomas Curran. One thousand people attended and approximately \$3,500 for new projects was netted.

The Docent Council Administrative Committee members were Mme. Austin Morris, Roland Perkins, Eugene Hammond, Donald Fisher, Rex Butler, Ralph Wallerstein, John Steinberg, George Osborne, Robert Dunne, Willard Norberg, John Schaupp and Joseph A. Moore, Jr. Our deep appreciation is expressed to them, as well as to all of the volunteer docents who are named among the Academy volunteers on page 17.

J. W. MAILLIARD, JR. LIBRARY

Ray Brian, Librarian. The Mailliard Library is our central repository for printed information about natural science, and there are also appropriate specialized libraries in each of the research departments and the aquarium.

Mailliard Library, with a staff of five regular employees, depends heavily on help of regular volunteers, as well as college student employees, in order to operate. It is a service department to all of the Academy, its members, and outside scholars. About 400 interlibrary loan requests were received from 121 other libraries located in 31 states and the District of Columbia, Canada, Germany, the Netherlands, Australia and Iran. Exchanges of scientific publications are maintained with 621 other institutions, 476 foreign and 145 domestic. In addition 373 books were purchased, and 332 serials, which with gifts and exchanges made a total of 2,167 serial titles, 38 monographs-in-part, and 571 books and documents.

PICTURE COLLECTION

Johan Kooy, Chairman. There are four primary functions of the Picture Collection: the cataloguing and storage of historical photographs relating to the Academy and its expeditions; the maintenance of a collection of botanical and zoological art works; the indexing and housing of thousands of contemporary nature photographs; and the organization, alphabetically and by subject, of the massive and encyclopedic Reference Picture Collection which contains more than 800,000 items.

More than 5,000 loans were made during the year. Eighteen dedicated volunteers assisted Mr. Kooy. Mr. Paul Anderson directed work in the Reference Collection, with the help of Mrs. Frances Iden, and Miss Muriel French and Mrs. Dorcas Whitehead organized work on the slide and historical collections.

There were many important gifts to the collections, by Mrs. Somers Peterson, Mr. Paul Anderson, Miss Sherry Ballard, Mr. and Mrs. J. E. McClellan, Mrs. Marguerite Gregory, Mr. and Mrs. Stephen Bechtel, Jr., and numerous other donors.

PACIFIC DISCOVERY

Bruce Finson, Editor, and Johan Kooy, Art Director. The Academy's popular bimonthly magazine increased to approximately 8,000 circulation and average press runs of 10,000 during the year. Mr. Finson increased coordination of magazine content with other Academy activities. An article by a staff member appeared in each issue. There was a special number on the Galapagos Islands in preparation for an Academy members' cruise. An article about Henry Evans, printmaker, was coordinated with a special Evans print show and his lecture at a members' meeting.

Drs. Robert T. Orr, Robert I. Bowman, and Robert C. Miller are Associate Editors. Dr. George E. Lindsay is Managing Editor.

EXHIBITS

Ernest R. Rook, Chairman and Curator. There was greater emphasis on changing or temporary exhibits during the year, made possible, in part, by the new facilities of Cowell Hall. The resulting dynamism and exploration of new areas of exhibition was refreshing, and made possible displays on the Galapagos Islands, photographic exhibitions by Ernest Braun and Edward S. Ross, a show of Henry Evans' prints, art exhibits by Chesley Bonestell and other painters, and many others.



Opposite page, exploring tide pools. (Photograph by Jeff Meyer) Above, Mr. Ed Harrison, Academy Fellow and President of the Board of Governors of the Los Angeles County Museum of Natural History, and Academy Associate Director Robert T. Orr at the introduction of the California condor commemorative stamp issued by the post office at the Academy June 12-13, 1971. Left, classes in the natural environment are a feature of Junior Academy field trips. (Photograph by Mark Ghiorso)

Of a more permanent character was a light-hearted ecology exhibit in Lovell White Hall of Man and Nature, and another called "Save the Bay for Life." Several dioramas in North American Hall were renovated, and an interpretive exhibit of the bears of the continent included a record size polar bear, shot and donated by Mr. David D. Bohannon, and a "blue" or "glacier bear" taken and donated by Mrs. Jean McCaughey.

The Barrett G. Hindes Memorial Exhibit which was developed for the north wall of Cowell Hall informs visitors about the California Academy of Sciences—its history, its purposes, descriptions of its research departments, a map showing tracks of its expeditions, and a changing display of unusual specimens or artifacts not ordinarily seen. The exhibit was sponsored by relatives and friends of Mr. Hindes, who was a member of the Board of Trustees from 1957 until his death in 1964.

PUBLIC INFORMATION

Hal Richardson, Public Information Officer. Spreading the word about the many activities, events, and special occurrences at the Academy is Mr. Richardson's province. The continued cooperation of all news media—press, radio, television—brings this to public attention. For this gratis service we are most grateful. New acquisitions for Steinhart are of general interest, as are the sky shows in Morrison Planetarium, the courses in the Junior Academy, the docent training programs, permanent and temporary exhibits, and the successful weekend musical programs in the planetarium to mention but a few.

During the past year, a handsome brochure devoted to the Academy was evolved with the generous cooperation of the San Francisco Convention & Visitors Bureau which

defrayed the cost of printing 50,000 copies and assumed the distribution thereof. *Motorland*, a magazine published monthly by the California State Automobile Association, featured a lengthy story about the Academy that reached approximately one million readers. Mr. Richardson was the Academy link with these two agencies as well as others.

He is responsible for the monthly Academy *NEWS-LETTER*, an occasional article in *PACIFIC DISCOVERY*, the arrangements for the monthly membership meetings, the Annual Meeting and Open House, and other gatherings. Mrs. Walter Buchen, as she has for the past ten years and on a volunteer basis, maintained the hefty Academy press book. Mrs. Grace Curtis also has given unstintingly of her time in maintaining press files.

DEVELOPMENT AND MEMBERSHIP

Raymond L. Finehout, Director of Development and Miss E. Sue Weaver, Membership Coordinator. There were 4,647 Academy and 322 Junior Academy members on July 1, 1970, and 5,838 adult and 430 junior members on July 1, 1971. This strong growth resulted from the work of the staff under the direction of the Membership Committee, of which Mrs. Joseph A. Moore, Jr., was chairman.

The two monthly evening meetings for members were so well attended that in June a supplemental matinee meeting was added. Total attendance of the June meetings was well over one thousand.

There were membership trips: two led by Mr. Alan J. Galloway to Point Reyes, one under the direction of Dr. Robert T. Orr to Guatemala, and more than two hundred members participated in an early morning low tide walk at Moss Beach.



The Development Office conducts continuing programs for support from corporations, foundations and individuals and provides staff assistance to trustee committees which are responsible for those activities.

RESEARCH ACTIVITIES

Basic research in the systematic and environmental sciences, the publication of the results of that research, and the maintenance of research collections and facilities for the use of the larger scientific community are the original and continuing purposes of the California Academy of Sciences. It is the most important such center in the western United States, and it is among the dozen or so world leaders in its fields.

General research activities will be reported under their respective departments, but some programs which deserve mention do not fit this system of classification. For example, Academy President A. Starker Leopold has undertaken a definitive study of the biology of the California valley quail, with the assistance of graduate student Michael Erwin and the support of a grant to the Academy by Mr. Peter McBean. Dr. Marston Sargent, an Academy employee headquartered at Scripps Institution of Oceanography, is the coordinator of the research program of the Marine Research Committee of the State of California and biologist Anatole S. Loukashkin continued his research on certain commercial fishes under the same contract. Research Associate Dr. Stanley C. Williams continued his comprehensive studies of scorpions with National Science Foundation support through the Academy, and Mr. Herman Real, under the Donald Patterson Fellowship, studied

the lepidoptera of Baja California. A striking result of Academy sponsored research was a beautiful flora of the Galapagos Islands by Ira Wiggins and Duncan Porter, published by Stanford University Press and written under a National Science Foundation grant to the Academy. Such grants and activities are desirable functions of the California Academy of Sciences.

BOTANY

Elizabeth McClintock, Acting Chairman and Curator. The herbarium contained 545,000 accessioned specimens on June 15, 1971, an increase of 29,367 during the year, and including 1,284 specimens of flowering plants from Lewis Rose, Ernest Twisselmann, and Gordon True, and 52 specimens of fungi from Dr. and Mrs. Robert T. Orr.

Chairman McClintock completed a writing project with Bailey Hortorium of Cornell University and returned to a monograph of *Spiraea* and work with ornamental plants of California. She served as Botanical Editor of the Journal of California Horticulture.

Dr. Dennis Breedlove made three collecting trips into the Sierra Madre Occidental of Sinaloa and Durango, Mexico, in cooperation with Stanford University and the Rancho Santa Ana Botanic Garden, on which more than 4,500 specimens of plants were taken. Dr. Breedlove also participated in an interdisciplinary project on plant-animal co-evolution coordinated by Dr. Paul Ehrlich of Stanford University and carried on at the Rocky Mountain Biological Laboratory in Colorado and the William Beebe Tropical Research Station at Trinidad, West Indies.

Curator Emeritus John Thomas Howell continued active field work in his preparation of floras of several areas of California, some in cooperation with Research Associates Thomas G. Fuller, Clare Hardman, Gordon H. True, and Ernest Twisselmann. Curator John H. Thomas was Editor of *Madrono*, was on the editorial board of *Brittonia*, and was on the editorial committee of the *Flora North America*.

ENTOMOLOGY

Paul H. Arnaud, Jr., Chairman and Associate Curator. The Entomology Department's collection of about 5,700,000 processed specimens is one of the most important in the world. During the year 100,341 were accessioned: 85,368 from gifts and 11,791 from expeditions. At the same time 59,572 specimens were loaned, mostly to graduate students in the United States, though several thousand went to scientists in Russia, Canada, Switzerland, England, Germany, Brazil and South America. Nearly two thousand visitor days were spent in the department by professional entomologists, graduate and undergraduate students, college class groups and others.

Many important collections were received as gifts, among them several numbering in the thousands of specimens from Paul S. Bartholomew, Hugh B. Leech, Thomas W. Davies, Stanley C. Williams, Chris Parrish, Benjamin H. Banta, and Dennis E. Breedlove. Smaller collections were also of great scientific importance because of rare



Left, a special exhibit about the Galápagos Islands, an area of particular interest to biologists and to the Academy, was presented. Above, the Barrett G. Hindes exhibit tells about the Academy's history and its present activities.

species or type specimens they contained. Major additions of 10,714 specimens to the Academy's scorpion collection came from Dr. Williams, Mr. Parrish and Mr. John Hjelle.

Mr. Thomas W. Davies and his daughter Mary Catherine spent four months collecting in North and South Borneo, Singapore, New Guinea, Australia, New Zealand, and Fiji, and returned with a remarkable collection of butterflies and other insects. Mr. Herman Real studied butterflies in southern Baja California, Dr. Arnaud worked in central Mexico, and Mr. Vincent Lee visited the islands of the Gulf of California on the *Perigrino* expedition organized by Dr. Michael Soulé. Mr. Leecii, Dr. Ross, and Dr. Williams collected in various parts of the United States.

Dr. Arnaud completed several years' work on a host catalogue of North American Tachinidae in a project supported by the U. S. Department of Agriculture. Dr. Cornelius B. Philip was in residence during the year, working on the Tabanidae.

GEOLOGY

Jean B. Firby, Acting Chairman. On November 20, 1970 Dr. G Dallas Hanna, Senior Curator and an Academy employee for 51 years, died at the age of 83. Dr. Hanna was a distinguished and versatile scientist, a world authority on diatoms, and a friend who cannot be replaced. Dr. Victor A. Zullo, Associate Curator, resigned effective December 31, 1970, to accept a teaching and administrative position with the University of North Carolina.

The invertebrate paleontological collections had 1,790 lots of specimens catalogued during the year, bringing the total to 44,938 specimen lots, and the geology type collection had 375 additions, for a total of 13,683 numbers. The additions included the types of *Pithanotarice starri* Kellogg, a sea lion, and the co-type *Puffinus diatomicus* Miller, both of which were formerly housed at Stanford and had been considered lost for the last thirty years. Other notable accessions included a fine specimen of stibnite from Felsobanya, Romania, from Mr. and Mrs. L. K. Land; a famous specimen of rose quartz crystals on smoky quartz from Minas Gerais, Brazil, given by Mr. Arthur Court; a collection of minerals from Tsumeb, S. W. Africa, from Mrs. Alan Hockschild; a world-wide synoptic collection of gems, from E. C. Altermatt; a collection of rare minerals from Russia donated by John Roger, and a show specimen of Wolframite, purchased with a \$2,500 grant from the Jack Wolfram Foundation.

Research Associate York T. Mandra was granted \$24,700 by the National Science Foundation for an eighteen month study of silicoflagellates from the Antarctic Ocean and South Pacific. Dr. Mandra returned from New Zealand where he was working at the time of Dr. Hanna's death. Mr. William F. Barbat, Chief Geologist of Standard Oil Company, retired in the fall of 1970 and became a Research Associate at the Academy where he worked on a book about the geology of California. Research Associate Alan J. Galloway completed a long study of the geology of the Point Reyes Peninsula. Curator Emeritus Leo Hert-

lein continued his research on San Diego Pliocene fossils. Mrs. Firby continued investigations of the marine-non marine fossil relationships in the Bay Area, and on lower Cambrian fossil remains from the Inyo Mountains in eastern California. Mr. Charles W. Chesterman conducted studies of volcanic activity and volcanic hazards.

HERPETOLOGY

Alan E. Leviton, Chairman and Curator. Dr. Steven C. Anderson, Associate Curator, resigned to accept a teaching position at Callison College, University of the Pacific, on August 31, 1970. Mr. Robert F. Drewes was promoted to Senior Curatorial Assistant on April 1, 1971.

Five thousand specimens accessioned during the year included collections of unusual importance from the western Sahara, Ghana, South Africa and Madagascar, collected and donated by Mr. Ted Papenfuss; the "small island" collection amassed by Research Associates Drs. Angel Alcala and Walter C. Brown in the central Philippines under a National Science Foundation grant through the Academy; and a very significant collection of reptiles and amphibians from eastern New Guinea sent by Mr. Fred Parker whose work was sponsored cooperatively by the Academy and the Museum of Comparative Zoology, Harvard University.

During the year 49 loans totaling 1,417 specimens were processed, and went to 21 institutions in the United States and 5 abroad.

Lighting and shelving were installed in a new alcohol collection storage room and the amphibian collection was transferred there. Most of the catalogued amphibians and reptiles from the former Stanford University collection were integrated into the Academy's collection, which now totals in excess of 215,000 specimens and is one of the largest research collections in the world.

Mr. Papenfuss returned from extended field work in Africa in the summer of 1970, while Mr. Drewes resumed his field studies in Kenya in June, 1971.

"The World of Reptiles," a seminar program, was presented at the Academy April 23-25 with the co-sponsorship of the University of California Extension. There were 225 student participants.

ICHTHYOLOGY

William N. Eschmeyer, Chairman and Associate Curator. The major project of the year was the transfer of the Stanford University fish collection to the Academy. Support was received from the National Science Foundation to assist in the movement of the Stanford collection, one of the most important in the world and numbering about 75,000 lots. Thus the California Academy of Sciences now has an extremely significant collection of about 165,000 lots, the second largest in the United States and the second or third largest in the world. In addition to the Stanford material, noteworthy collections were received from Franz Steiner, John McCosker, the Australian Museum, the University of Miami, the Smithsonian Oceanographic Sorting Center, and the Micronesian Institute.

Assistant Curator of Ornithology Laurence C. Binford found land iguanas of interest during his visit to the Galápagos Islands in July, 1970.

AN INVITATION TO MEMBERSHIP

You are invited to become a member of the West's oldest scientific organization and to join us in exploring the fascinating world of the natural sciences. As a member of the California Academy of Sciences you will be entitled to free admission to the Academy and its monthly membership meetings, as well as complimentary tickets to showings at Morrison Planetarium. Members receive subscriptions to the Academy's journal, *Pacific Discovery*, and its monthly *Newsletter*, are eligible for a 10% discount on purchases at sales desks, and are invited to take part in field trips and scientific excursions planned especially for the membership.

If you are already an Academy member, you may wish to share this membership application with a friend or colleague.

APPLICATION FOR MEMBERSHIP

I wish to make application as a member of the
(see classifications below)
California Academy of Sciences.

Name

Address

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Type specimens of new species were received from John E. Randall, David K. Caldwell, John McCosker, Jay Quast, William Eschmeyer, Gerald Allen, and Robert Wisner.

Dr. Warren C. Freihofer joined the staff as Associate Curator in February, 1971, and worked full-time on the transfer of the Stanford collection.

Miss Pearl Sonoda supervised the loan service which sent out 4,012 specimens to 40 individuals in 53 transactions. These were mostly specimens used for systematic studies by ichthyologists and students but also included some unusual loans; a portion of a swordfish preserved 25 years ago for study of mercury levels in its tissues, gifts of specimens for study of radiation to establish base-levels in the sea in previous years, and the loan of a coelacanth heart and pituitary gland for morphological and biochemical studies.

Dr. Eschmeyer continued systematic studies of scorpionfishes, supported in part by a National Science Foundation grant. Mrs. Lillian Dempster worked with Dr. Eschmeyer on an extensive catalog of the 800 species of scorpaenoid fishes, and with Curator Emeritus W. I. Follett and Research Associate Carl L. Hubbs on the list of California fishes. Miss Terry Arambula, research assistant to Dr. Eschmeyer, studied tropical scorpionfishes for her Master's thesis at San Francisco State College.

INVERTEBRATE ZOOLOGY

Allyn G. Smith, Chairman and Associate Curator.

About 10,000 specimen lots of preserved invertebrate animals were received as gifts during the year, including 672 from Robert Setzer; more than 9,000 from Field Associate Franz B. Steiner, collected by him and by commercial trawl-fishermen in Sagami Bay, Japan, the Gulf of Thailand, the Formosan Strait, the Korean Strait, and in Subic Bay, Philippine Islands. Nearly all of the invertebrate phyla are represented in these accessions. Mr. Calvin D. Randolph gave approximately 100 specimen lots from deep water in the Gulf of Thailand. Mr. George Mendenhall gave several very important preserved deep-water mollusks. More than 500 specimen lots were trawled off the California coast in San Francisco Bay in the fall of 1970 by the Micronesian Institute's research vessel *Searcher*. Mr. Dustin Chivers participated in making some of those collections. The transfer of the Stanford University invertebrate collections, started in 1963, was completed with the transfer of 272 specimen-lots of cephalopods and a few echinoderms, including 9 holotypes and 7 paratypes of octopi and squids. Dr. and Mrs. Thomas Burch gave a large collection from the northern part of the Gulf of California taken from the "Choya Bay Oceanographic Station" which was located north of Puerto Penasco, Sonora. Field Associate Robert R. Talmadge donated deep-water invertebrates, including rare octopi, starfishes, silicious sponges and crustaceans, which were taken off Humboldt Bay, California.

Volunteer associates and assistants are of great importance to this rapidly growing, but understaffed, department, and are, in fact, responsible for that growth.



ORNITHOLOGY AND MAMMALOLOGY

Robert T. Orr, Chairman and Curator. Ninety-six specimens of birds and 386 mammals were added to the collection during the year. Two hundred mammals were secured by Research Associate Dr. John Arnold and his student Craig Moe while they participated in a study of possible vectors of hemorrhagic fever in Chiapas, Mexico, in cooperation with Dr. Robert Goldsmith of the Hooper Foundation. The department's collections now contain approximately 82,100 birds and 20,400 mammals.

Chairman Orr, who serves as Associate Director of the Academy, devoted much time to responsibilities of that position. He led a seventeen-day trip to Guatemala for members, was advisor for and taught study courses given for docent trainees, and led several field trips for that group. He helped develop a program for the issuance of the condor commemorative stamp at the Academy on June 12 and 13, and helped organize and served as program chairman for the University of California Extension symposium on "Giants of the Sea" held in San Francisco October 2-4, 1970.

Dr. Binford participated in a trip to the Galapagos Islands and Amazon Basin, sponsored by the Belvedere Scientific Fund, in July and August, 1970. He completed research on the identification and distribution of waterthrushes in California and continued his study of the birds of Oaxaca. He was active in the Point Reyes Bird Observatory organization and programs. During an oil spill crisis in January he coordinated efforts of concerned persons and organizations, dealt with the press, and participated in two television panel discussions to inform the public about the problem.

Mrs. Schonewald served as coordinator of information concerning the California sea lion epizootic plague, and received reports on nearly 600 affected animals. She

was coauthor of an article on the subject which appeared in *Science*. Much of Mrs. Schonewald's research is concerned with marine mammals.

SCIENTIFIC PUBLICATIONS

Edward L. Kessel, Editor, and Diana Young, Editorial Assistant. A total of 795 pages of scientific publications were published during the year: 507 pages of *Proceedings* and 288 pages of *Occasional Papers*. Volume 38 of the *Proceedings*, which appeared December 31, 1970, was dedicated to George Sprague Myers and was written by his former students.

George E. Lindsay, Leo G. Hertlein, and Edward L. Kessel, serving on the Publications Committee, reviewed all manuscripts submitted for publication.

WORK STUDY PROGRAM

The EOA work-study program of the U. S. Department of Health, Education and Welfare provided financial assistance to students who might otherwise not be able to attend college. The Academy, under contracts with San Francisco State College, the University of San Francisco, and the University of California, employed 52 students on a part-time basis. Dr. Alan Leviton bore the heavy task of interviewing, selecting, and keeping records of time worked by the work-study participants. During the year the students worked 11,937 hours, equivalent to more than seven full-time positions, for which the Academy's cooperative share of wages was \$6,014. Several very fine technical personnel have developed in this program.

George E. Lindsay

GEORGE E. LINDSAY
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EOA—*Economic Opportunity Act. Work-study student sponsored by the Federal Government Health, Education and Welfare Department through the University of California, Berkeley, San Francisco State College, or the University of San Francisco*

NSF—*National Science Foundation sponsored. There were an additional seven positions supported by the Institutional Support Grant which terminated April 1.*

ACADEMY VOLUNTEERS

During the year many of the Academy's activities were augmented by volunteers who generously donated their time and services. Some assisted in the various departments: typing, cataloging, and performing other necessary tasks, while others served as docents after completing the docent training course. We are most grateful to the following:

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 Mr. Paul Anderson, Library and
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STAFF BIBLIOGRAPHY 1970-1971

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CALIFORNIA ACADEMY OF SCIENCES
BALANCE SHEET — JUNE 30, 1971 AND 1970

ASSETS		1971	1970	LIABILITIES AND FUND BALANCES		1971	1970
Cash:							
Commercial accounts		\$ 50,317	\$ 60,671	Note payable to bank with interest at 5½ %, due September 13, 1971 with securities pledged as collateral\$ 210,000 \$ 210,000			
Savings accounts		74,639	106,995				
		124,956	167,666				
Receivables:							
Research grants:							
National Science Foundation		44,068	43,743	Accounts payable 10,283 15,064			
Other Federal agencies		4,590	5,616				
City and County of San Francisco		21,458	25,059	Accrued liabilities 4,143 14,564			
Other		7,673	8,095				
		77,789	82,513	Total liabilities 224,426 239,628			
Inventories—at lower of cost or market		20,337	13,754				
Investments—at cost:							
Land		608,084	608,084	Fund balances (Note 5):			
Commercial Building		516,819	516,819				
Accumulated depreciation		(516,819)	(516,819)	Operating, unrestricted 45,467 41,513			
Marketable securities—at cost:				Endowment, unrestricted 2,259,095 2,171,923			
Special Purposes Fund (market 1971, \$745,192; 1970, \$509,412)		731,248	635,776	Restricted to research 91,793 82,272			
Endowment Fund (market 1971, \$1,922,345; 1970, \$1,461,077; pledged \$210,000)		1,818,990	1,738,426	Restricted to plant improvements 31,604 30,493			
		3,158,322	2,982,286	Restricted to other special purposes 738,061 690,121			
Buildings (Note 2)		—	—				
Collections, library and equipment (Note 3)		—	—	3,166,020 3,016,322			
Unamortized lease commissions		9,042	9,731				
		\$3,390,446	\$3,255,950	\$3,390,446 \$3,255,950			

The accompanying notes are an integral part of the financial statements.

CALIFORNIA ACADEMY OF SCIENCES
STATEMENT OF CHANGE IN FUND BALANCES
YEARS ENDED JUNE 30, 1971 AND 1970

	1971	1970
Funds received:		
Contributions (Note 1):		
Membership dues	\$ 80,515	\$ 64,247
Business organizations and foundations	150,304	73,317
Individuals and trusts	202,918	357,752
	<u>433,737</u>	<u>495,316</u>
Operating income:		
From the City and County of San Francisco for support of aquarium and museum operations ..	597,479	583,677
From Federal, State and other agencies for support of research and curatorial activities	92,560	195,885
Planetarium	128,237	143,215
Admissions	370,049	—
Restaurant royalty	53,266	48,749
Sundry sales	157,938	150,771
Other	77,325	42,493
	<u>1,476,854</u>	<u>1,164,790</u>
Endowment income:		
Rent from Commercial Building	125,197	137,140
Interest and dividends	120,371	104,230
Gain from sale of securities	2,840	52,159
	<u>248,408</u>	<u>293,529</u>
Total funds received	2,158,999	1,953,635
Expenditures:		
Aquarium and museum	662,553	596,881
Departmental research and curatorial activities	518,422	499,968
Planetarium	80,803	74,687
General and administrative	414,997	326,348
Cost of sundry sales	178,412	155,076
Plant additions	—	21,199
Special purpose activities	94,721	18,365
Employees' pension annuity (Note 4)	28,444	27,548
Other	30,949	28,858
Total expenditures	<u>2,009,301</u>	<u>1,748,930</u>
Excess of funds received over expenditures (including gifts to Endowment Fund)	149,698	204,705
Balance, beginning of year	3,016,322	2,811,617
Balance, end of year	<u><u>\$3,166,020</u></u>	<u><u>\$3,016,322</u></u>

Certain reclassifications of the figures for the year ended June 30, 1970, not affecting net change in fund balances, have been made to conform with the current year's presentation.

The accompanying notes are an integral part of the financial statements.

CALIFORNIA ACADEMY OF SCIENCES
NOTES TO FINANCIAL STATEMENTS
JUNE 30, 1971

1 — Accounting Method

Grants from Governmental agencies are recognized when awarded, while gifts and bequests from individuals, trusts and private organizations are recognized when received. Gifts of specimens and collections which have no established value are not included in the financial statements.

2 — Buildings

Under the terms of the Charter of the City of San Francisco, no one other than the City may hold title to buildings on City property. As the Academy facilities in Golden Gate Park were acquired, title was transferred to the City of San Francisco. The buildings, excluding Cowell Hall, were valued at \$14,126,000 by independent appraisal in 1968. Cowell Hall was completed in 1969 at a cost of \$1,545,000.

3 — Collections, Library and Equipment

Collections, library and equipment are expensed in the year of acquisition. The Academy staff has estimated the replacement cost of collections, library and equipment to be in excess of \$10,000,000.

4 — Employees' Pension Annuity Plan

On January 1, 1964, the Academy adopted a pension annuity plan for all regular full-time staff members under the age of 59 as of that date.

Contributions to the plan are based on 5% of employee's salary to \$7,800, and 7.5% of salary over that. The pension annuity expense was \$28,444 for the current year. There is no past service liability and it is the Academy's policy to fund current pension costs.

5 — Change in Fund Balances, Year Ended June 30, 1971

<u>Fund</u>	<u>Fund Balances 6/30/70</u>	<u>Excess of Funds Received over Expenditures</u>	<u>Appropriations Between Funds</u>	<u>Fund Balances 6/30/71</u>
Operating, unrestricted	\$ 41,513	\$ 23,954	(\$20,000)	\$ 45,467
Endowment, unrestricted	2,171,923	67,172	20,000	2,259,095
Restricted to research	82,272	9,521		91,793
Restricted to plant improvements	30,493	1,111		31,604
Restricted to other special purposes	690,121	47,940		738,061
	<u>\$3,016,322</u>	<u>\$149,698</u>	<u>\$ —</u>	<u>\$3,166,020</u>

ACCOUNTANT'S REPORT

The Board of Trustees
California Academy of Sciences
San Francisco, California

We have examined the balance sheet of the California Academy of Sciences as of June 30, 1971 and the related statement of change in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet and the related statement of change in fund balances present fairly the financial position of the California Academy of Sciences at June 30, 1971 and the results of its activities for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

San Francisco, California
August 3, 1971

HURDMAN AND CRANSTOUN, PENNEY & CO.
Certified Public Accountants

CONTRIBUTIONS

No summation of the year would be complete without acknowledgment of the support given the Academy by business organizations, private foundations and individuals, whose gifts—past and present—have made possible scientific research, curatorial activities, field expeditions, educational programs and public exhibits. A number of Academy programs are funded either directly through gifts, grants and bequests, or indirectly through income from endowment and contributed property. In terms of capital expenditures, all of the Academy's buildings have been made possible by private benefactions.

BUSINESS ORGANIZATIONS AND FOUNDATIONS

Through its annual support, the corporate community helps provide the resources needed for systematic research in the biological sciences, as well as a wide range of educational activities for young people and adults. Grants from private foundations and other organizations also provide unrestricted support and funding for specific projects and endowment. Corporate and Foundation gifts and grants were received from:

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Standard Oil Company of California
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J. Val Strough Foundation
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Syntex Corporation
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Tenneco Chemicals, Inc., Cal/Ink Division
Tiffany & Co.
Title Insurance and Trust Company
Transamerica Corporation
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Union Bank
United Airlines
United California Bank
United States Steel Corporation
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